

WHAT IS CLAIMED

1. An apparatus for mandrel-assisted resin transfer molding an article comprising:

an outer female mold element having an interior surface associated with a first surface of said article;

5 and

an inner male mold element having an exterior surface associated with a second surface of said article, and being sized to be placed within said outer female mold element, so as to define a mold assembly forming a
10 mold cavity between said interior surface of said outer female mold element and said exterior surface of said inner male mold element, said mold cavity receiving a structural preform to be impregnated with resin, said inner male mold element having a perimeter sidewall that
15 extends a vertical distance alongside, but is spaced apart from, a mutually facing interior sidewall of said outer female mold element, so as to form a generally continuous narrow annular channel between an outer perimeter edge of said inner male mold element and an
20 inner perimeter edge of said outer female mold element, said channel extending to and being contiguous with said mold cavity, to allow venting of air and expansion therethrough of resin that has been introduced into said mold cavity and has impregnated said structural preform
25 therein.

2. The apparatus according to claim 1, further including a plurality of indexing tabs affixed to said inner male mold element, and being configured to engage said outer female mold element so as to accurately
5 dimensionally locate said inner male mold element within the interior volume of said outer female mold element.

3. The apparatus according to claim 1, further including an auxiliary closure engaging said mold assembly and coupled to a vacuum, which is operative to augment the outflow of resin and removal of air pockets
5 from said mold cavity through said channel.

4. The apparatus according to claim 3, further including a plurality of indexing tabs affixed to said inner male mold element, and being configured to engage said outer female mold element so as to accurately
5 dimensionally locate said inner male mold element within the interior volume of said outer female mold element.

5. A method of manufacturing an article comprising the steps of:

(a) providing an outer female mold element having an interior surface associated with a first surface of
5 said article;

(b) providing an inner male mold element having an exterior surface associated with a second surface of said article, and being sized to be placed within an interior region of said outer female mold element, so as to define
10 a mold assembly forming a mold cavity between said interior surface of said outer female mold element and said exterior surface of said inner male mold element, said inner male mold element having a perimeter sidewall that is adapted to extend a vertical distance alongside,
15 but spaced apart from, a mutually facing interior sidewall of said outer female mold element when said inner male mold is inserted into said outer female mold;

(c) placing a structural preform within said interior region of said outer female mold element;

20 (d) introducing resin into said interior region of said female mold element and thereby wicking fibers of said structural preform;

(e) inserting said inner male mold element within said interior region of said outer female mold element,
25 so as to form therewith said mold cavity of said mold assembly, and also a generally continuous narrow annular channel that is contiguous with said mold cavity, through which air is vented and into which resin introduced in step (d) is allowed to expand from said mold cavity; and

30 (f) after curing of said resin, removing said mold assembly to provide a resin transfer molded article.

6. The method according to claim 5, further including the step of:

(g) removing a band of cured resin formed along an edge of said resin transfer molded article provided in
5 step (e) as a result of resin outflow from said mold cavity into said channel.

7. The method according to claim 5, wherein step (e) includes locating said inner male mold element within said interior region of said outer female mold element by means of a plurality of indexing tabs that engage said
5 inner male mold element and said outer female mold element.

8. The method according to claim 5, wherein step (e) includes coupling an auxiliary closure with said mold assembly and applying thereto a vacuum, so as to augment outflow through said channel of resin and removal of air
5 pockets from said mold cavity.

9. The method according to claim 8, wherein step (e) includes locating said inner male mold element within said interior region of said outer female mold element by means of a plurality of indexing tabs that engage said
5 inner male mold element and said outer female mold element.